LESSON 7-1

Success for English Language Learners

Ratio and Proportion

Steps for Success

Step I Introduce the lesson.

- Review the vocabulary with students. Several of the words have multiple definitions, especially *mean* and *extreme*. Help students differentiate among the definitions of *mean:* intend (*I mean to diet after the holiday.*), indicate (*The asterisk means a higher cost for that item.*), unkind (*He was mean to a kitten.*), and average (*The mean of the grades is 87.*). Also explain the different definitions of *extreme:* highest degree (*He had an extreme talent for football.*), furthest from the center (*Minus thirty was the extreme low temperature for Pittsburgh.*), and either of two things as different from each other as possible (*Her clothes were the extreme opposite of her mother's dress.*)
- Be sure to help students study the *Vocabulary Notes* at the beginning of the chapter material. This will give them some insight into the derivation and meanings of the vocabulary words they will encounter in the chapter.

Step II Teach the lesson.

- Help students make the connection between the models built for the movies and the times in their own lives that they have seen or used scale models. Perhaps they have visited a museum that features a large-scale model of the human heart, or played with a dollhouse or model trains.
- If you have chosen to have students keep their own Math Notebook, allow time for them to add the entries presented in this lesson and subsequent lessons of the chapter. Review the new vocabulary words by asking students to give examples or to define the words as they arise during class.

Step III Ask English Language Learners to complete the worksheet.

- Problem 1 on the worksheet supports Example 2 in the student textbook. Students will need to remember the Polygon Angle Sum Theorem, and that a pentagon has five sides.
- Problem 2 on the worksheet supports Example 3 in the student textbook. If students are unfamiliar with the cross products method of solving proportions, give them other examples of equivalent fractions that they can test for equality.
- Think and Discuss supports the problems on the worksheet.

Making Connections

- Use Problem 1 to review the Polygon Angle Sum Theorem and various methods of writing ratios.
- Use Problem 2 to check students' understanding of using cross products to solve proportions.

Name ______________________________________ Date ___________ Class ____________

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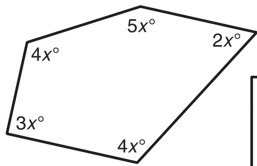
Problem 1

The ratio of the angles of a pentagon is 2 : 4 : 3 : 4 : 5. What is the measure of the largest angle?

The sum of the measures of the angles of a polygon is $(n - 2)180°$, where n is the number of angles of the polygon.



Pentagon:
- 5 sides
- 5 angles

Find the number of degrees in a pentagon. A pentagon has five angles.

$$(n - 2)180° = (5 - 2)180° = 3(180°) = 540°$$

Let the angles of the pentagon be $2x$, $4x$, $3x$, $4x$, and $5x$.

$2x + 4x + 3x + 4x + 5x = 540°$ Add the angles.

$18x = 540$ Simplify.

$\frac{18x}{18} = \frac{540}{18}$ Divide both sides by 18.

$x = 30$

The largest angle of the pentagon is $5x$, or $5(30) = 150°$.

Problem 2

Solve the proportion $\frac{3x}{5} = \frac{16.56}{12}$.

Cross Products Property:

In a proportion, if $\frac{a}{b} = \frac{c}{d}$ and b and $d \neq 0$, then $ad = bc$.

$\frac{3x}{5}$ $\frac{16.56}{12}$ → 5×16.56, $3x \times 12$

$3x(12) = 5(16.56)$ Cross Products Property

$36x = 82.8$ Simplify.

$x = 2.3$

Think and Discuss

1. How do you know which variable will be the numerator of the ratio fraction?

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2. How can you show that the proportions $\frac{3(2.3)}{5}$ and $\frac{16.56}{12}$ are equivalent?

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CHAPTER 7

7-1 Ratio and Proportion

1. The variable that is mentioned first in the problem will be the numerator of the fraction.
2. You can use cross products. If the cross products are equal, then the proportions are equivalent.

7-2 Ratios in Similar Polygons

1. Congruent polygons are the same size and shape. Similar polygons are the same shape but may be a different size.
2. You have to match the corresponding sides so you can get the right similarity ratio for each pair of sides.

7-3 Triangle Similarity: AA, SSS, and SAS

1. The triangles might be similar, but you cannot prove they are similar with just this information.
2. You can write a proportion of the lengths of the sides and check whether or not they are equivalent.

7-4 Applying Properties of Similar Triangles

1. Set up the proportion by comparing the corresponding parts of the sides of the triangles.
2. If the ratios were not equal, then line $\overleftrightarrow{AB}$ would not be parallel to $\overline{XY}$.

7-5 Using Proportional Relationships

1. The diagram is larger than the gear. You can tell because the first part of the scale ratio represents the drawing. Because 4 cm is greater than 2 mm, the actual gear must be smaller than the diagram.
2. No; there would be a different scale for each state because the sizes of the states are very different.

7-6 Dilations and Similarity in the Coordinate Plane

1. You know the sides are corresponding sides because $\overline{PQ}$ is on the same side of the triangle as $\overline{PS}$ and $\overline{PR}$ is on the same side of the triangle as $\overline{PT}$.
2. You can name P as point 1 with the ordered pair $(-4, -3)$ corresponding to (x_1, y_1) and Q as point 2 with the ordered pair $(-2, 0)$ corresponding to (x_2, y_2). Then you can substitute the numbers from the ordered pairs into the formula.

CHAPTER 8

8-1 Similarity in Right Triangles

1. The square root represents a distance. Distance cannot be negative.
2. Use the Pythagorean Theorem:

   $(14\sqrt{5})^2 + (7\sqrt{5})^2 \stackrel{?}{=} 35^2$

   $980 + 245 \stackrel{?}{=} 1225$

   $1225 = 1225$

8-2 Trigonometric Ratios

1. Use the cosine ratio when the measure is given of a side that is adjacent to an angle whose measure is given and the hypotenuse is the measure that needs to be found. Use it also when the measure of the hypotenuse is known and the side whose measure needs to be found is adjacent to an angle whose measure is given.
2. The measure of a leg and the measure of one of the acute angles need to be known. Use the sine or cosine ratio (depending on the relationship between the leg and the angle) because both ratios include the hypotenuse.

8-3 Solving Right Triangles

1. They are the same; both ratios would use $\frac{XZ}{YZ}$. The cosine ratio uses the side adjacent to $\angle Z$, which is also the side opposite $\angle Y$ that can be used for $\sin Y$.